

STEREO MOC Status Report  
Time Period: 2017:142 - 2017:148

STEREO Ahead (STA) Status:

1. The following Ground System anomalies/events occurred during this reporting period:

- On day 143, during the DSS-14 support, receipt of real-time telemetry and monitor data and commanding was 53 minutes late as a result of a power anomaly at the Goldstone complex that affected the JPL to MOC communications. The antenna was tracking nominally and all telemetry data was being recorded at the station. Once communications were restored, the MOC received telemetry at 1853z and all SSR data was recovered. This anomaly resulted in the loss of 53 minutes of real-time telemetry, commanding, and monitor data. See DR #N110599 for more information.
- On day 145, during the DSS-14 support, the transmitter was declared red just before BOT (2300z). Maintenance was eventually able to resolve the issue, and the uplink established at 2313z. This anomaly resulted in the loss of 4.75 minutes of real-time data and 2.75 minutes of SSR data due to a late BOT (2304z), and an additional loss of 6338 frames of SSR data between 2304z and 2359z due to intermittent loss of turbo decoder lock. Note that currently there is a data gap for all instruments from 144-1853z through 2350z that is larger than should be. The MOC is investigating. See DRs #G118164 and #G118165 for more information.
- On day 148, during the DSS-63 support, turbo decoder lock was lost intermittently between 1641z and 1643z. This anomaly resulted in the loss of 1885 frames of SSR data. See DR #N110610 for more information.

2. The following spacecraft/instrument events occurred during this week. The Ahead observatory operated nominally during this week.

- On day 142, the 99<sup>th</sup> momentum dump was executed successfully at 1400z, which imparted an estimated delta V of 0.084 m/sec. This was the 18<sup>th</sup> momentum dump that did not use the IMU. After thruster operations completed, there was a 0.49 degree of roll angle error which was dampened out over the

next 6.5 minutes. Fine pointing stabilized 2.8 minutes after completion of the momentum dump.

- On day 143, during the DSS-14 support, the IMPACT team conducted real-time commanding to increase the Magnetometer instrument's high rate data return.
- The average daily science data return for Ahead was 6.2 Gbits during this week.

#### STEREO Behind (STB) Status:

1. Detailed status of the recovery activities this week to restore operations is listed below.
  - None.
2. The Behind loss of communication anomaly occurred on October 1, 2014. Post superior solar conjunction, recovery operations resumed on November 30, 2015. By implementing the NASA Failure Review Board recommendations, the first recovery attempt began with carrier detection by the DSN on August 21<sup>st</sup>, through September 23, 2016. At a spacecraft range of ~2 AU, the observatory was found to be rotating slowly about its principal axis of inertia for which the uncontrolled attitude allowed some solar array input and continuous uplink and downlink communications on the LGA at emergency data rates. Over the next 22 continuous days, significant obstacles to recovery were overcome with a collaborative effort of the JHU/APL engineering team, NASA GSFC, DSN, FDF, SSMO scheduling, and Mission Operations teams. This consisted of:
  - Reliably commanding a rotating spacecraft with uncontrolled attitude at a distance of 2 AU
  - How to power on the spacecraft that was never designed to be off without collapsing the battery voltage
  - Acquiring telemetry at 35 bps from a spacecraft that is rotating with an uncontrolled attitude
  - Warming a frozen propulsion subsystem with a degraded battery and limited solar array input with an uncontrolled attitude
  - Configuring, loading, and verifying EA, C&DH, and G&C parameters and macros with very limited telemetry
  - Conducting an autonomous momentum dump in the blind and transitioning to C&DH standby mode and successfully

receiving telemetry on the HGA indicating star tracker lock and decreasing system momentum.

However, system momentum level remained above the threshold for re-establishing attitude control with the reaction wheels. Due to the uncontrolled attitude, communication degraded and the last detection of the carrier was on September 23<sup>rd</sup>.

Behind Observatory Status - From the last telemetry received on September 18<sup>th</sup> and the telemetry assessment review held on February 24<sup>th</sup>, main bus voltage is low, 3 out of 11 battery cells are bypassed, attitude remains uncontrolled, rotating about its principal axis of maximum moment of inertia. While likely all ~42 kg of hydrazine remains and is frozen, both pressure transducers are not functioning. EA mode is enabled and autonomy is disabled. The battery charge rate is C/10. RF is configured for the +Z LGA at emergency data rates and the range of the expected best lock frequency is known. Necessary macro sequences have been tested to allow the peak power tracker in C&DH standby mode to protect the battery. These macro sequences will be loaded to EEPROM when the communications supports longer commands.

Monthly recovery efforts consist of attempting to power on the transmitter for 30 minutes. If no carrier signal is detected, battery recovery operations will commence which consist of repeatedly sweeping a 4 kHz uplink range and sending commands for IEM switched power and PDU 1553 interface bus off. The next recovery tracks are on June 9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup>.

Recovery planning continues with weekly discussions to refine the plan and procedures for the next recovery attempt this Fall by incorporating recommendations from the BEHIND telemetry assessment review and lessons learned. The next recovery planning meeting is on Thursday, June 1<sup>st</sup> at 9 AM EDT.